

What is claimed is:

1. A channel estimation method which a receiving apparatus in a mobile communication system uses to obtain a  
5 channel estimation result for use in the detection of a data signal received from a transmitting apparatus, wherein said receiving apparatus receives a data signal containing a plurality of data symbols from said transmitting apparatus, estimates a data signal channel condition for each data symbol  
10 of said received data signal, and detects said received data signal for each of said data symbol in accordance with the estimation result.

2. The channel estimation method according to claim 1, wherein said receiving apparatus receives a pilot signal from  
15 said transmitting apparatus and uses said pilot signal to estimate said channel.

3. The channel estimation method according to claim 2, wherein said receiving apparatus estimates the amplitude variation or phase rotation with a propagation for said received  
20 data signal in accordance with said pilot signal.

4. The channel estimation method according to claim 2, wherein said channel is estimated using the symbols of one or more pilot signals containing a symbol that is closest in

reception timing to a data symbol of said data signal to be detected.

5        5. The channel estimation method according to claim 2, wherein said pilot signal is sampled at a rate lower than a symbol rate of said data signal, and the sampled pilot signal is interpolated into the symbol rate of said data signal using an FIR filter operating at the symbol rate of said data signal and entered into the FIR filter, and wherein the output of the filter is used as a channel estimation result.

10       6. The channel estimation method according to claim 5, wherein the coefficient of said FIR filter is determined in accordance with an impulse response, which is determined by a Fourier transform of predetermined low-pass characteristics.

15       7. The channel estimation method according to claim 5, wherein said pilot signal is on the same channel as for said data signal and inserted between the symbols of said data signal at predetermined intervals for transmission.

20       8. The channel estimation method according to claim 2, wherein the symbol rate of said pilot signal is equal to the symbol rate of said received data signal.

9. The channel estimation method according to claim 2, wherein said pilot signal is passed through a low-pass filter having a passband of a specified frequency and lower frequencies and used for channel estimation.

10. The channel estimation method according to claim 1, wherein said received data signal is multilevel-modulated by said transmitting apparatus.

11. A receiving apparatus in a mobile communication  
5 system, comprising:

a channel estimator for estimating the channel variation between a transmitting apparatus and the receiving apparatus in accordance with a received signal;

a detector for detecting the received signal in  
10 accordance with an estimation result produced by said channel estimator; and

a demodulator for demodulating said detected received signal,

wherein said received data signal includes a plurality  
15 of data symbols;

wherein said channel estimator operates at a data symbol rate of said received data signal to perform channel estimation for each data symbol; and

wherein said detector detects said received data signal  
20 for each of said data symbol.

12. The receiving apparatus according to claim 11, wherein said channel estimator estimates said channel variation using a pilot signal received from said transmitting apparatus.

13. The receiving apparatus according to claim 12, wherein said channel estimator estimates the amplitude variation or phase rotation with a propagation for said received signal in accordance with said pilot signal.

5        14. The receiving apparatus according to claim 12, wherein said channel estimator comprises a plurality of series-connected delay devices for delaying an entered pilot signal, a plurality of multipliers for multiplying the outputs of said plurality of delay devices by a plurality of  
10        predetermined coefficients, and an adder for adding up the outputs of said plurality of multipliers, and operates at a symbol rate of said data signal and uses the output of said adder to estimate said channel variation.

15        15. The receiving apparatus according to claim 14, wherein said pilot signal is entered into said channel estimator after being sampled at a rate lower than the symbol rate of said data signal, wherein said entered pilot signal is interpolated into the symbol rate of said data signal using a predetermined value, and wherein the resulting interpolated signal is entered  
20        into a plurality of delay devices.

16. The receiving apparatus according to claim 15, wherein the coefficients of said plurality of multipliers are determined in accordance with an impulse response, which is

determined by a Fourier transform of predetermined low-pass characteristics.

17. The receiving apparatus according to claim 14,  
wherein at least one of said plurality of coefficients is a  
5 negative value.

18. The receiving apparatus according to claim 14,  
wherein said channel estimator comprises a plurality of  
series-connected delay devices for delaying an entered pilot  
signal, a plurality of multipliers which are smaller in number  
10 than the delay devices and used for multiplying the outputs of  
said plurality of delay devices by a plurality of predetermined  
coefficients, and an adder for adding up the outputs of said  
plurality of multipliers, and operates at a symbol rate of said  
data signal and uses the output of said adder to estimate said  
15 channel variation.

19. The receiving apparatus according to claim 12,  
wherein said channel estimator includes a low-pass filter for  
passing a pilot signal for use in said channel estimation.